(19) JAPANESE PATENT OFFICE

PATENT ABSTRACTS OF JAPAN

(11) Publication number: **05344069 A**

(43) Date of publication of application: **24.12.93**

(51) Int. Cl **H04B 10/10**
H04B 10/22

(21) Application number: **04147158**

(22) Date of filing: **08.06.92**

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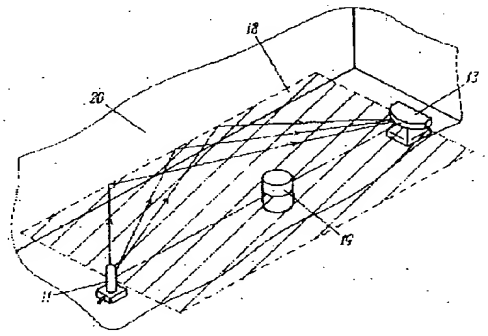
(54) OPTICAL SPACE SIGNAL TRANSMITTER

(57) Abstract:

PURPOSE: To receive a reflected light from a wall efficiently by receiving the light with an optical reception unit whose light collection capability is improved for the light from a planer direction only.

CONSTITUTION: An optical transmission unit 11 has a radiation distribution with a strong radiation intensity in a direction almost along a plane 18 tying the optical transmission unit 11 and an optical reception unit 13 and the optical reception unit 13 has a light collection characteristic with a high light collection efficiency from a direction along the plane 18. Even when an obstacle 19 such as a person or an object shuts the optical transmission unit 11 and the optical reception unit 13, the light radiating in an oblique direction along the plane 18 is reflected in a wall face 20 and received efficiently by the optical reception unit 13 having the high light collection efficiency from the direction along the plane 18 by providing the radiation distribution to the optical transmission unit 11 and the light collection characteristic to the optical reception unit 13 in this way. Thus, the optical space signal transmission is attained even with the obstacle 19.



DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the optical space signal-transmission equipment used for voice, a video signal, space transmission of data, etc.
[0002]
[Description of the Prior Art] Since it says in recent years that the degree of freedom of a layout increases in connection between audio equipment, a visual equipment, and a data processor, the optical space transmission system is put in practical use partly.
[0003] Conventional optical space signal-transmission equipment is explained below. Drawing 10 and drawing 11 show conventional optical space signal-transmission equipment. According to this drawing, 1 is an optical transmitting unit and the light emitting device 2 is arranged inside. 3 is an optical receiving unit and the photo detector 4 is arranged inside. About the optical space signal-transmission equipment constituted as mentioned above, the actuation is explained below. The electrical signals 5, such as a sound signal, are inputted into the optical transmitting unit 1, and the inputted electrical signal is changed into the signal 6 of the light emitted in space from a light emitting device 2 by the optical transmitting unit. The emitted lightwave signal 6 reaches the photo detector 4 of the optical receiving unit 3, is changed into an electrical signal 7 by the optical receiving unit 3, and is taken out.
[0004] Thus, the signal transmission by light can be performed, without connecting the inside of space for an electric code etc.
[0005]
[Problem(s) to be Solved by the Invention] However, with the above-mentioned conventional configuration, since the light which reaches a photo detector 4 decreased extremely when people and an object 8 interrupted between the optical transmitting unit 1 and the optical receiving units 3, it had the technical problem of a signal transmission becoming impossible.
[0006] This invention solves the above-mentioned technical problem, and even if people and an object interrupt between the optical transmitting unit 1 and the optical receiving units 3, it aims at offering the optical space signal-transmission equipment in which a signal transmission is possible.
[0007]
[Means for Solving the Problem] In order to solve this technical problem, distribute along a certain flat surface in space from an optical transmitting unit, and the optical space signal-transmission equipment of this invention makes light emit, and is considered as the configuration which receives light by the optical receiving unit which heightened condensing capacity only within the light from [above-mentioned] a flat surface.
[0008]
[Function] A signal transmission is made possible, even if it can receive the reflected light from a wall efficiently and people and an object interrupt between an optical transmitting unit and optical receiving units by this configuration.
[0009]
[Example] Drawing 1 and drawing 2 explain one example of the optical space signal-transmission equipment of this invention below.
[0010] In this drawing, the optical transmitting unit in which 11 built the light emitting device 12, and 13 are the optical receiving units which built in the photo detector 14. When it is

changed into a lightwave signal 16, and the electrical signal 15 inputted into the optical transmitting unit 11 is emitted from a light emitting device 12, reaches a photo detector 14 and is transformed into an electrical signal 17 by the optical receiving unit 13, it is the same as that of the conventional example that an optical space signal transmission is performed.
[0011] The point that this example differs from the conventional example is that the condensing effectiveness from a direction in which the optical receiving unit 13 met the flat surface 18 has a condensing high property while the intensity of radiation to the direction which met mostly the flat surface 18 at which the optical transmitting unit 11 contains the straight line which connects the optical transmitting unit 11 and the optical receiving unit 13 has strong radiation distribution.
[0012] Also when the obstructions 19, such as people and an object, interrupt between the optical transmitting unit 11 and the optical receiving units 13 like drawing 2 by considering as radiation distribution of the above optical transmitting units 11, and the condensing property of an optical receiving unit, the light emitted in the direction of slant along the flat surface 18 reflects in a wall surface 20, and can receive light efficiently by the optical receiving unit 13 with the condensing high effectiveness from a direction along a flat surface 18. For this reason, also when interrupted by the obstruction 19, an optical space signal transmission becomes possible.
[0013] Although some which receive the reflected light from a wall etc. by making condensing effectiveness from an omnidirection equal mostly were in the receiving unit conventionally, according to this example, the reflected light from a wall etc. can be efficiently transmitted by restricting the direction where condensing effectiveness is high to a flat surface 18.
[0014] In addition, since the rolling mechanisms 25 and 26 for optical-axis adjustment which can change an inclination according to the above-mentioned flat surface 18 are formed in the optical transmitting unit 11 and the optical receiving unit 13 as shown in drawing 2 , even if a difference is in the height of the optical transmitting unit 11 and the optical receiving unit 13 like drawing 3 , a flat surface 18 can be established easily.
[0015] Below, a means to give strong reflective distribution in the direction along a flat surface 18 is explained to the optical transmitting unit 11. First, drawing 4 (a) and (b) explain one example of the configuration of the optical transmitting unit 11.
[0016] According to this drawing, two or more light emitting devices 12 are arranged at the optical transmitting unit 11, and although, as for the light emitting device 12 of the upper part 21, the optical axis has turned to the direction of a transverse plane, the light emitting device 12 of the upper part 22 leans and arranges the optical axis to the longitudinal direction. It can consider as strong luminous-radiation distribution of optical reinforcement in the direction which met the flat surface 18 by this. In addition, in this example, although light was distributed in the direction along a flat surface 18 by leaning the optical axis of the light emitting device of the upper part 22, a light emitting device 12 can acquire the same effectiveness by forming a reflecting plate 23, without leaning like drawing 5 . Moreover, as shown in drawing 6 (a) and (b), the same effectiveness is acquired also by using the cylinder side-like concave lens 24.
[0017] Then, a means to give the condensing high property of the condensing effectiveness from a flat surface 18 to the optical receiving unit 13 is explained. Drawing 7 (a) and (b) explain one example of the configuration of an optical receiving unit first. According to this drawing, a lens, and 34-36 are photo detectors, and 31-33 form three light sensing portion article 31a-33a which made lenses 31-33 and the optical axis of photo detectors 34-36 mostly in agreement, respectively. These three light sensing portion articles lean an optical axis along the direction 37 parallel to a flat surface 18, and are attached.
[0018] If this meets in the direction 37 parallel to a flat surface 18, it has a large angle of beam spread, but if met in a flat surface 18 and the right-angled direction 38, an angle of beam spread is narrow and can realize an optical receiving unit with the condensing high effectiveness from a direction in which the flat surface 18 met. In addition, in immobilization with lenses 31-33 and photo detectors 34-36, if adhesion immobilization is carried out through a lens material and transparence adhesives with an almost equal refractive index, the reflection loss of the light in a fixed side can be reduced.
[0019] Drawing 8 (a) and (b) show other examples of an optical receiving unit, and in this

drawing, it is a lens, and 41-43 carry out the contiguity unification of the three pieces, and they are fixing them. 44-46 are photo detectors. By considering as such a configuration, as for three photo detectors 44-46, the condensing effectiveness of the light from the direction of 47-48 becomes high with the nearby lenses 41-43, respectively. Like the above-mentioned example of an optical receiving unit, if met in the direction 37 parallel to a flat surface 18, it has a large angle of beam spread, but if met in a flat surface 18 and the right-angled direction 38, an angle of beam spread is narrow and can realize an optical receiving unit with the condensing high effectiveness from a direction in which the flat surface 18 met.

[0020] Furthermore, according to this example, with the lenses 41 and 43 of both ends, the condensing effectiveness from the direction of 50 and 51 also becomes high, and, as for the central photo detector 45, can acquire condensing high capacity, for example. In addition, if the conductive transparence plate 53 is formed and grounded between the lens and the photo detector like drawing 8 , a shielding effect can be given, without spoiling most optical properties. If an antireflection film is further formed in the base material of this conductive transparence plate 53 using the material and the ingredient with an almost equal refractive index of a lens, loss by reflection of light can also be reduced. Moreover, it cannot be overemphasized that it is obtained even if it prepares in optical receiving units other than the above-mentioned example about a shielding effect with the conductive transparence plate 53.

[0021] Drawing 9 (a) and (b) show other examples of an optical receiving unit, and according to this drawing, 61-63 are photo detectors and a lens, and 64-66 are being fixed through the material of the conductive transparence plate 68 and lenses 61-63, and the transparence material block 67 with an almost equal refractive index, respectively. Thereby, like the example of drawing 7 , if met in the direction 37 parallel to a flat surface 18, it has a large angle of beam spread, but if met in a flat surface 18 and the right-angled direction 38, an angle of beam spread is narrow and can realize an optical receiving unit with the condensing high effectiveness from a direction in which the flat surface 18 met. In addition, in this example, since the transparence material block 67 was established, thickness of lenses 61-63 can be made thin, and it becomes possible to use low price lenses, such as a resin molding lens. Moreover, it also becomes easy to give a shielding effect with conductive transparence resin 68.

[0022]

[Effect of the Invention] This invention can receive the reflected light from a wall efficiently, and even if people and an object interrupt between an optical transmitting unit and optical receiving units, it can realize the outstanding optical space signal-transmission equipment in which a signal transmission is possible as mentioned above by distributing along a certain flat surface in space from an optical transmitting unit, making light emit, and considering as the configuration which receives light by the optical receiving unit which heightened condensing capacity only within the light from [above-mentioned] a flat surface.

[Translation done.]

CLAIMS

[Claim(s)]

[Claim 1] Optical space signal-transmission equipment with which the luminous-radiation reinforcement to the direction which met mostly a certain flat surface containing the straight line which connects an optical transmitting unit and an optical receiving unit consists of a transmitting unit which has strong radiation distribution, and a receiving unit which has the large optical system of the condensing capacity of the light from [above-mentioned] a flat surface.

[Claim 2] Optical space signal-transmission equipment according to claim 1 which consists of an optical transmitting unit which established the optical-axis adjustment means which carries out adjustable [of the optical axis] according to the inclination of a certain flat surface containing the straight line which connects an optical transmitting unit and an optical receiving unit, respectively, and an optical receiving unit.

[Claim 3] The optical space signal-transmission equipment which consists of an optical receiving unit which had two or more light sensing portion articles which made a lens and the optical axis of a photo detector mostly in agreement with the optical transmitting unit which distributed in the direction along a certain flat surface containing the straight line which ties the optical axis of two or more light emitting devices for an optical transmitting unit and an optical receiving unit, and has leaned and arranged in it, distributed in the direction which met the above-mentioned flat surface mostly, and has leaned and arranged the optical axis of two or more above-mentioned light sensing portion articles in it.

[Claim 4] Optical space signal-transmission equipment according to claim 3 which established the lens material and the transparence material block with an almost equal refractive index between two or more lenses of an optical receiving unit, and two or more photo detectors, and carried out adhesion immobilization of a lens, a transparence material block, and a photo detector and a transparence material block.

[Claim 5] The optical space signal-transmission equipment which consists of an optical receiving unit which has arranged as each optical axis is at the above-mentioned flat surface mostly about two or more photo detectors behind two or more lens groups which it approached and compared with the optical transmitting unit which distributed in the direction along a certain flat surface containing the straight line which ties the optical axis of two or more light emitting devices for an optical transmitting unit and an optical receiving unit, and has leaned and arranged in it as an optical axis is in the above-mentioned flat surface mostly.

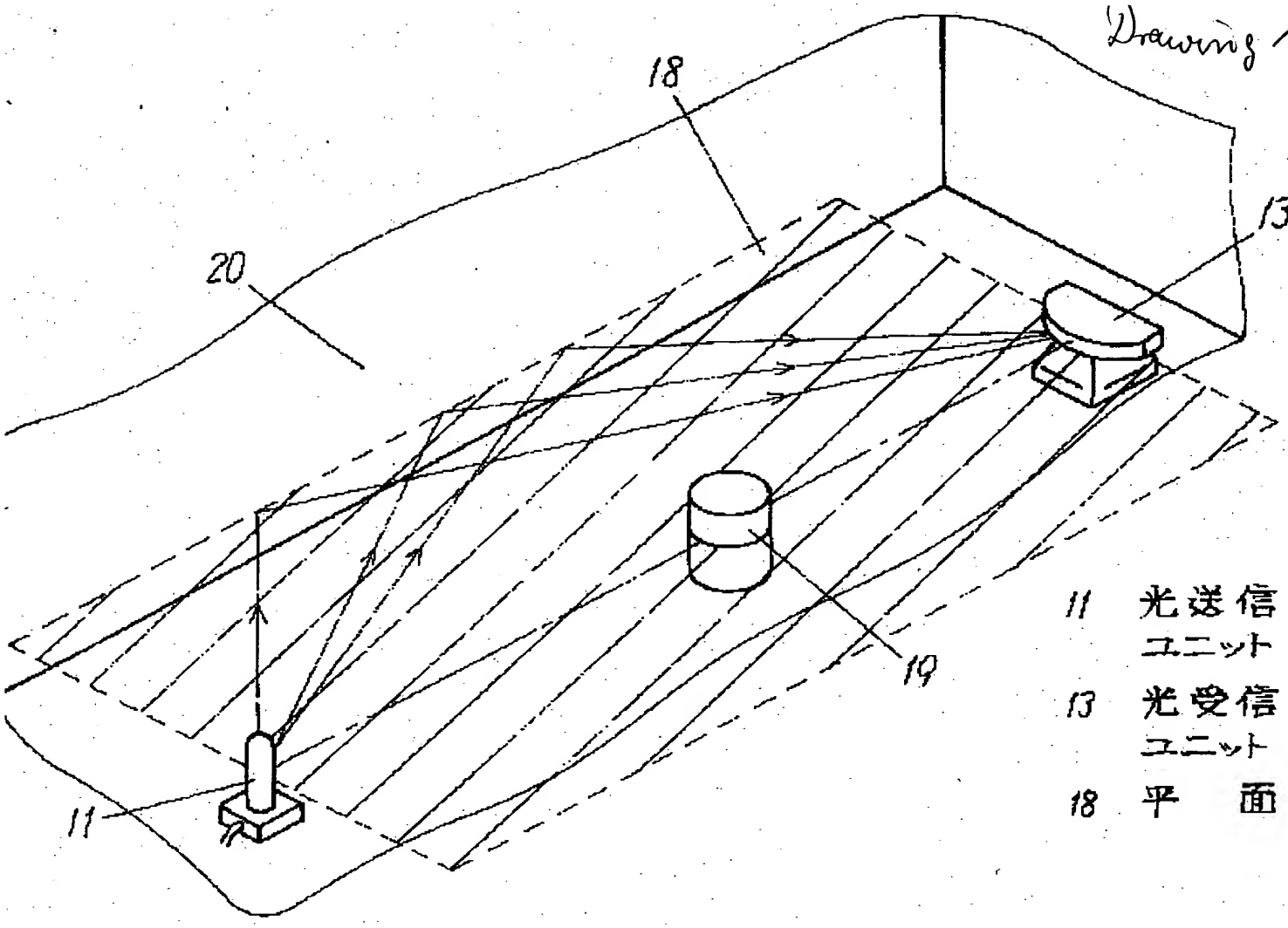
[Claim 6] Claim 3 which formed the conductive transparence plate between the lens and the photo detector, optical space signal-transmission equipment according to claim 4 or 5.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The explanatory view of the busy condition of optical space signal-transmission equipment 1 example of this invention
[Drawing 2] This side elevation
[Drawing 3] The explanatory view explaining the busy condition of ****
[Drawing 4] (a) The plan of one example of the optical transmitting unit which is this important section
(b) This side elevation
[Drawing 5] The plan of other examples of the optical transmitting unit which is this important section
[Drawing 6] (a) The plan of other examples of the optical transmitting unit which is this important section
(b) This side elevation
[Drawing 7] (a) The plan of one example of the optical receiving unit which is this important section
(b) This side elevation
[Drawing 8] (a) The plan of other examples of the optical receiving unit which is this important section
(b) This side elevation
[Drawing 9] (a) The plan of other examples of the optical receiving unit which is this important section
(b) This side elevation
[Drawing 10] The explanatory view of the busy condition of conventional optical space signal-transmission equipment
[Drawing 11] This block diagram
[Description of Notations]
11 Optical Transmitting Unit
12 Light Emitting Device
13 Optical Receiving Unit
14 Photo Detector
18 Flat Surface
25 26 Rolling mechanism
31, 32, 33 Lens
31a, 32a, 33a Light sensing portion article
34, 35, 36 Photo detector
41, 42, 43 Lens
44, 45, 46 Photo detector
53 Conductive Transparence Plate
61, 62, 63 Lens
64, 65, 66 Photo detector
67 Transparence Material Block
68 Conductive Transparence Plate

Drawing 1

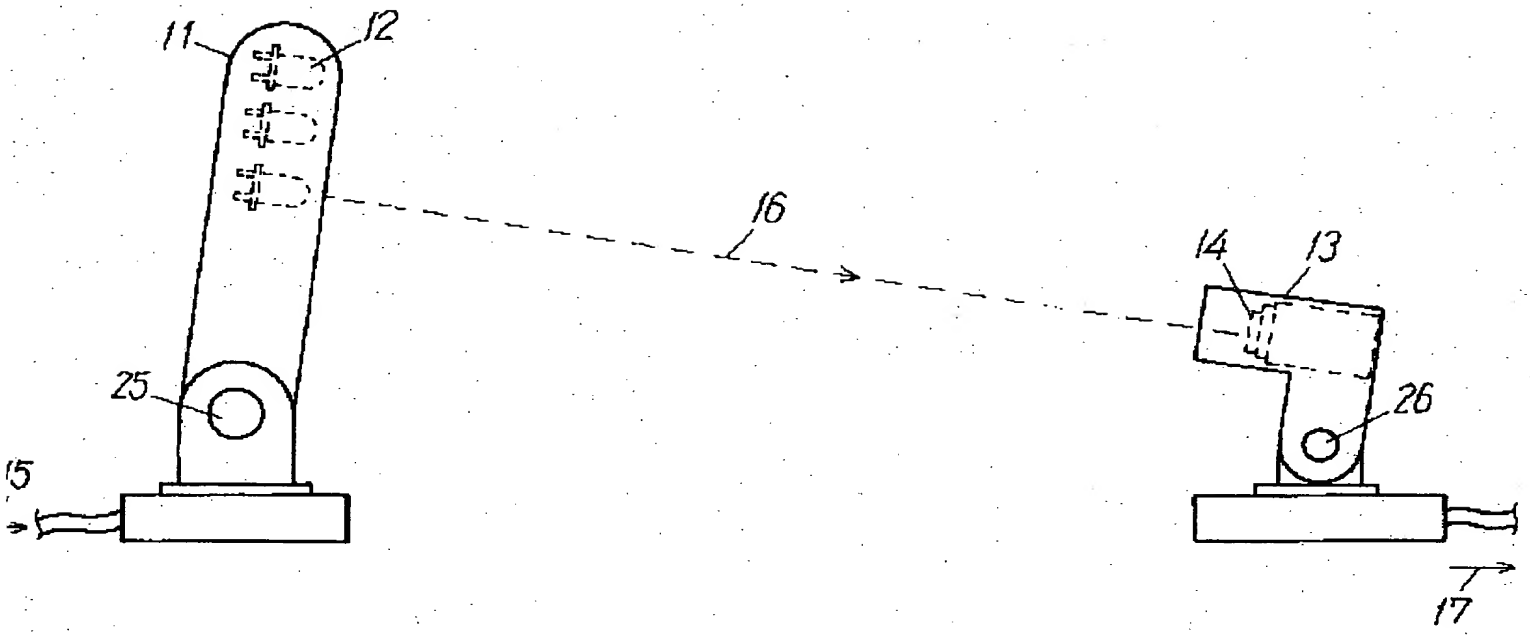


11 光送信ユニット

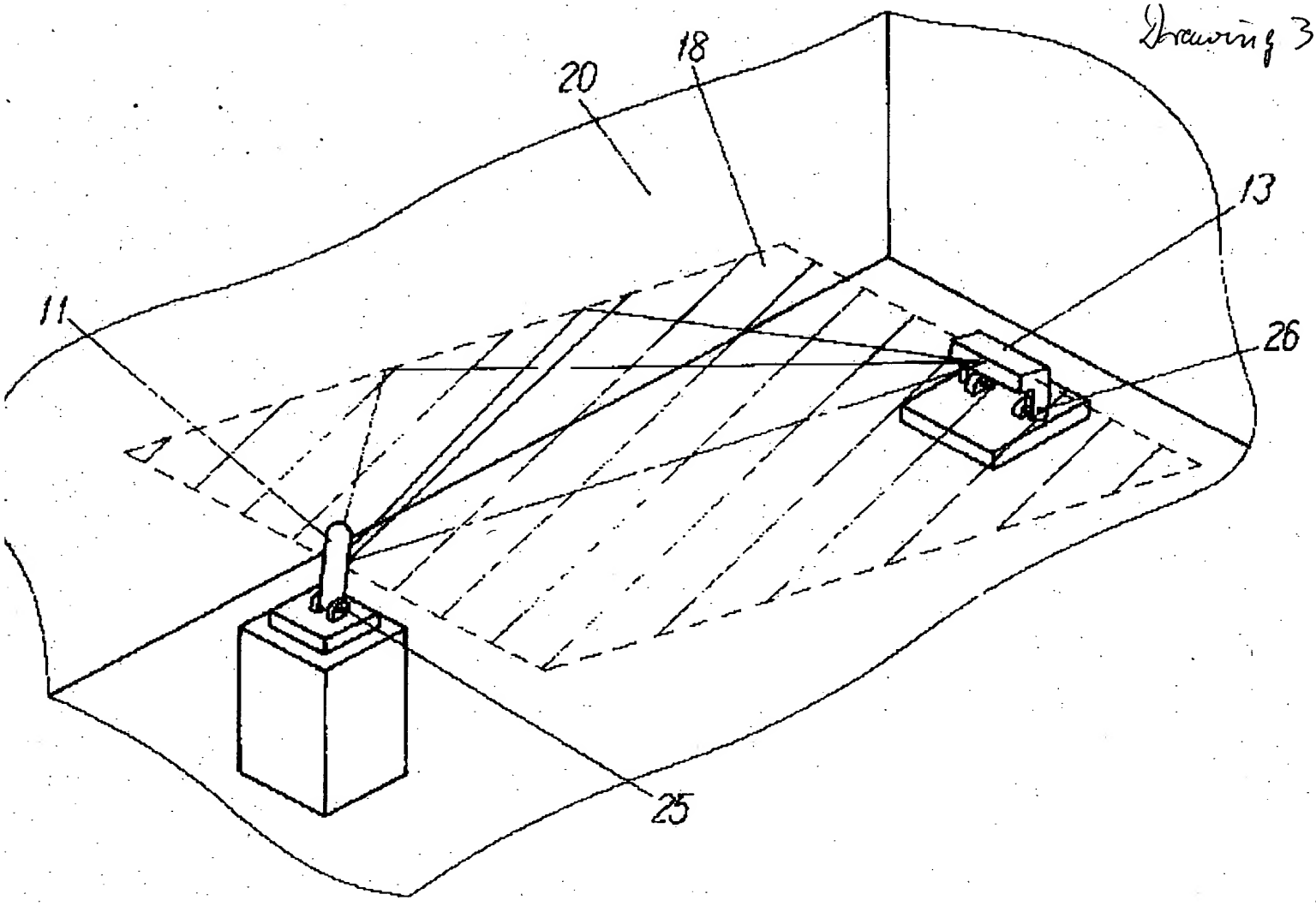
13 光受信ユニット

18 平　面

Drawing 2

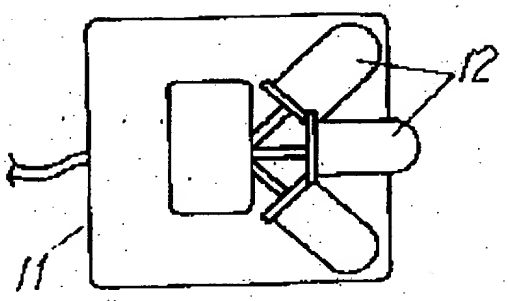


Drawing 3

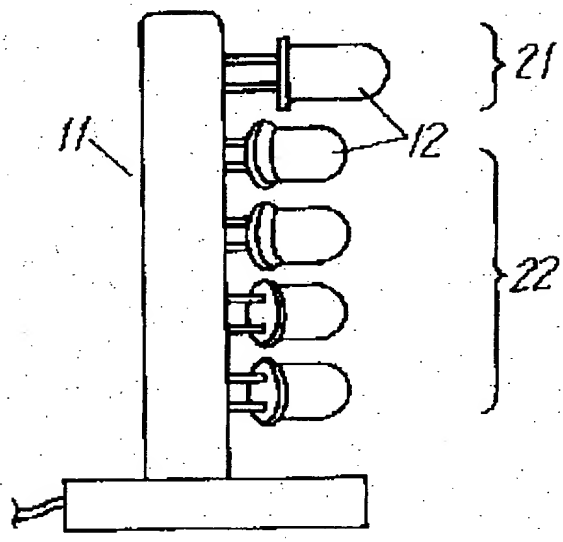


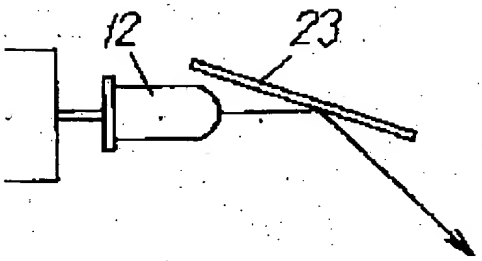
Drawing 4

a)



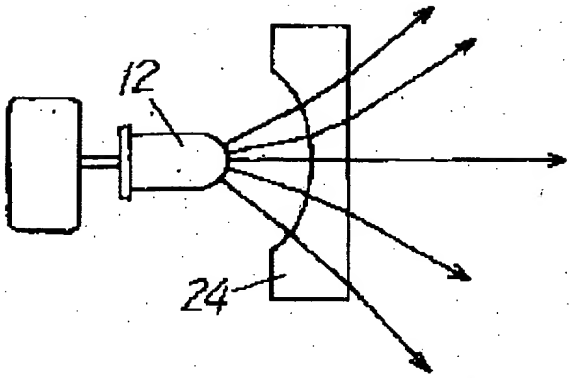
b)



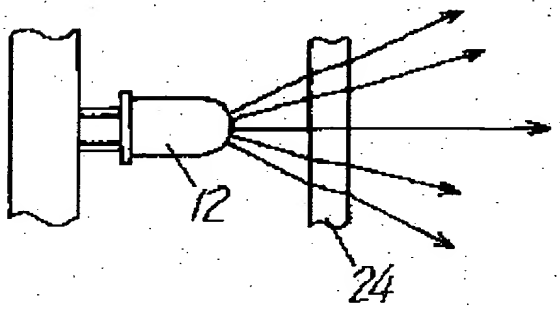


Drawing 5

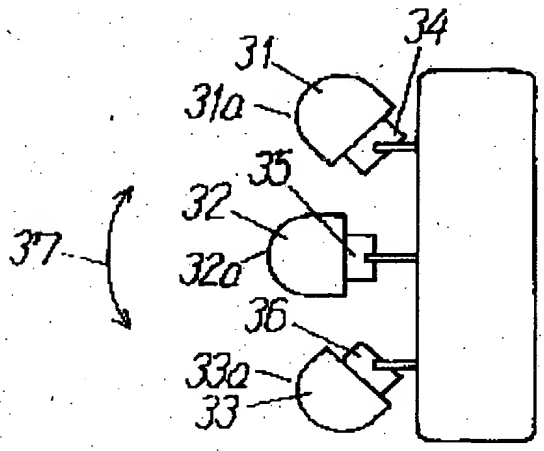
a)

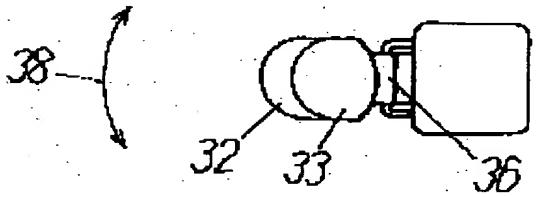


b)

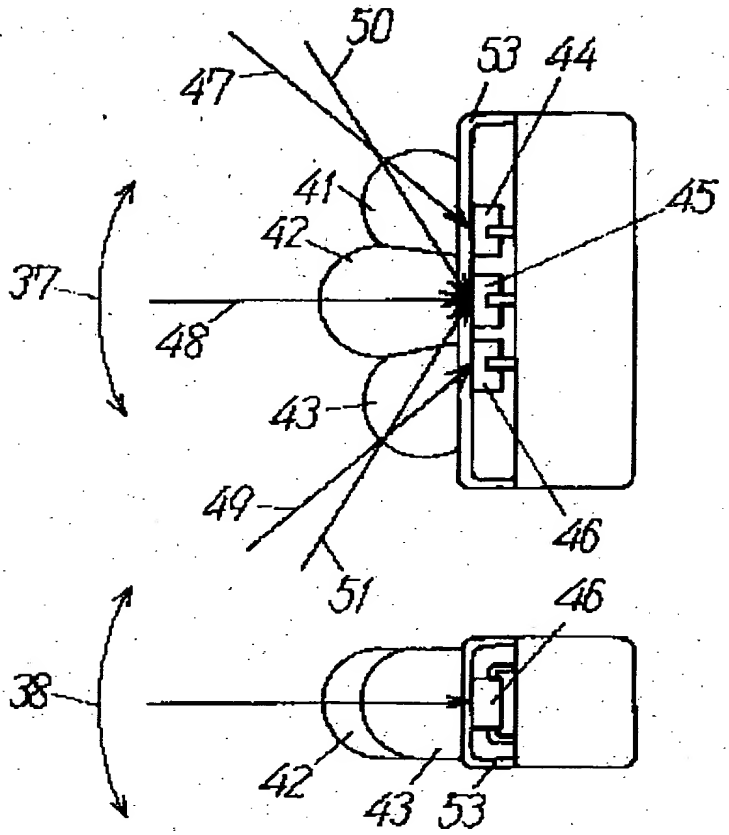


Drawing 7

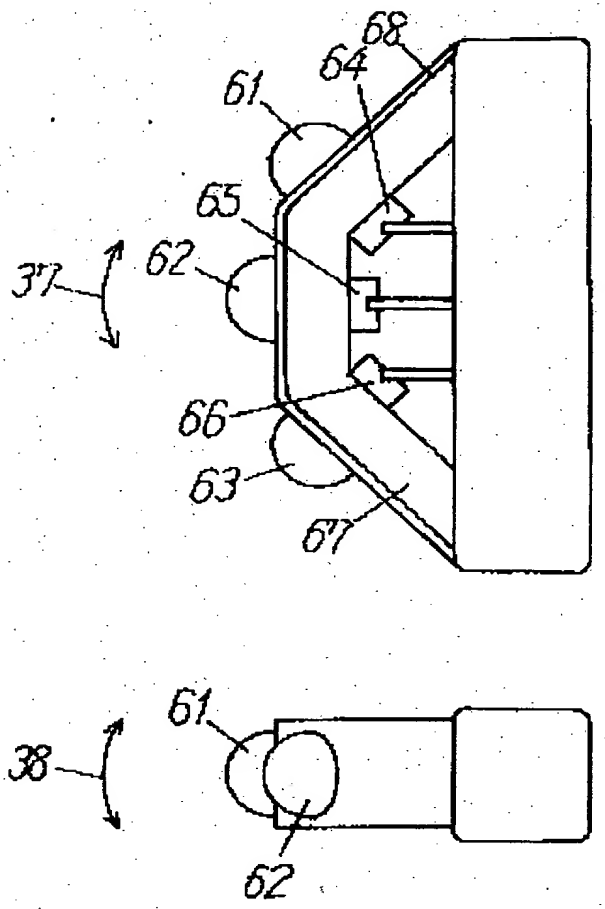




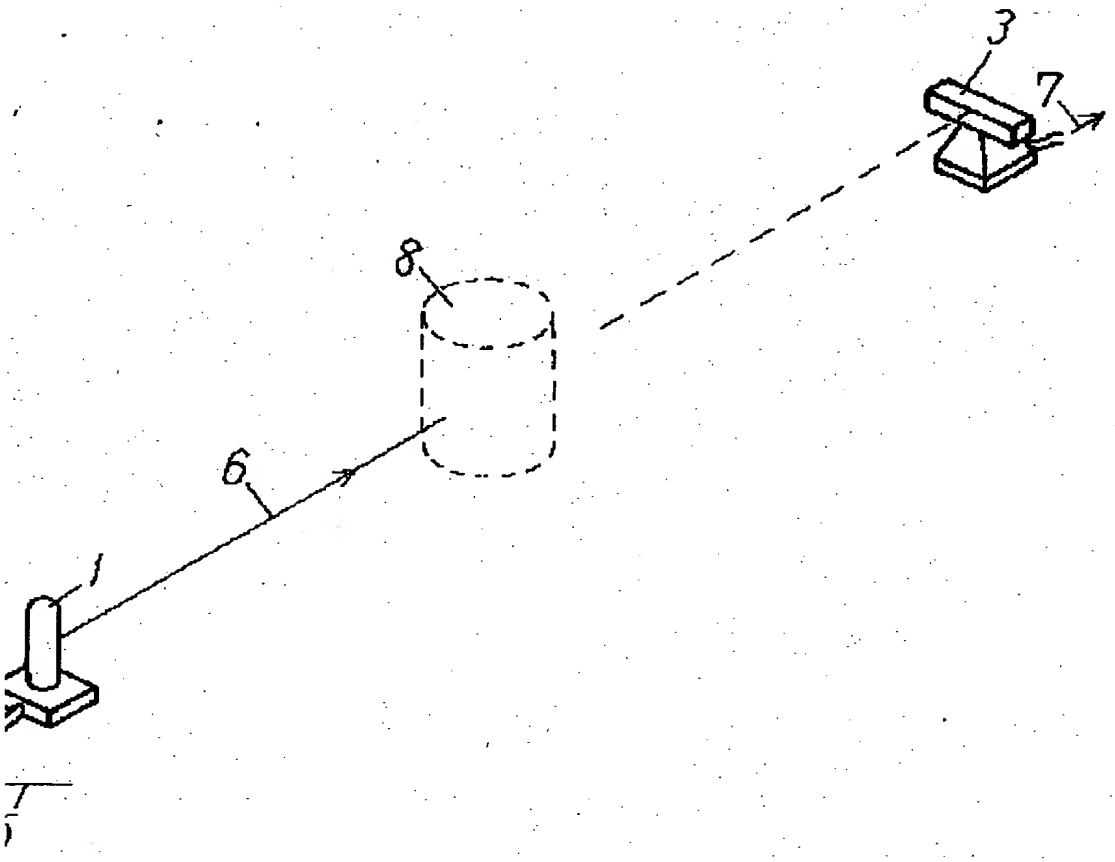
Drawing 8



Drawing 9



Drawing 10



Drawing 11